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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

Report on

INSECTS IN RELATION TO

THE CUTTING OF PINES IN EMERGENCY CONSERVATION WORK IN

SOUTHEASTERN UNITED STATES.

By

R. A. St. George, Associate Entomologist, and  
E. J. Hucksapahler, Field Aide, Division of Forest Insects,  
Bureau of Entomology, U. S. Department of Agriculture

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CONSERVATION WORK IN SOUTHEASTERN UNITED STATES**

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INSECTS IN RELATION TO THE CUTTING OF PINES IN EMERGENCY  
CONSERVATION WORK IN SOUTHEASTERN UNITED STATES

Introduction

Timber stand improvement and the construction of fire lanes and truck trails constitute an important phase of the national program that is being conducted by the Forest Service and cooperating states through the medium of the Civilian Conservation Corps to place the forests of the country on a sustained yield basis.

Pine, being one of the most important tree species in southeastern United States, is receiving major consideration. The stands are being improved by thinning those which are overstocked and, in the case of others, by releasing the overtopped more desirable tree species by means of cutting and girdling. The methods used in thinning the stands vary in different regions. In some, all of the trees are being felled and lopped according to recommended forest practices<sup>1</sup>, in others, the majority of them are being hack-

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1. Stand-Improvement Measures for Southern Forests. Emergency Conservation Work Forestry Pub. no. 3, 1933, 57 pp.

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Measures for Stand Improvement in Southern Appalachian Forests. Emergency Conservation Work Forestry Pub. no. 1, 1933, 57 pp.

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girdled, felling only those which would obviously be blown over.

The thinning of overstocked stands has meant the removal of from 20 to 60 percent of the trees on thousands of acres of land.

Such an operation has resulted in the accumulation of large quantities of slash and the girdling of many acres of pine, thereby



creating conditions which have much significance from an entomological aspect.

Since pine has many insect enemies, their consideration is of utmost importance. This is especially true in areas where plans are being considered for the extension of cutting operations throughout the summer months.

That insects will be attracted to areas where pine has been treated is a foregone conclusion. Its significance, however, as to the extent of hazard involved from insect attack resulting from such treatment, is somewhat problematical, since no precedent has been established where pine has been so heavily thinned in this manner over such large areas.

Fortunately there is now available considerable information on the habits of the insects concerned, which has been accumulated over a period of years in different parts of the country under varying conditions, which makes it possible to anticipate what is likely to happen under the present circumstances.

The Susceptibility of Pine Stands to Attack as the Result of Cultural Work, Cutting Fire Lines, Trails, etc.

The susceptibility of pine stands to attack by insects is often dependent upon a number of interrelated environmental factors, such as the occurrence of drought, fire, blowdowns, accumulation of slash, mild winters, etc., - conditions favorable for rapid increase in beetle population and unfavorable for tree growth.



The following account deals with the habits of the southern pine beetle (*Pseudotsuga frontalis* Zimm.) and with the largest of the Ips engraver beetles (*Ips calligraphus* Germ.), two insects of importance to pine in the South. It also is concerned with the possibilities of their attraction to pine stands which have been treated culturally or otherwise.

#### The Southern Pine Beetle

The history of epidemics of the southern pine beetle reveals that this insect is to be feared principally during years of drought, and that at such times all classes of trees are susceptible to attack. For this reason, during normal years, it is not likely that the cultural treatment of pine will result in the attraction of this beetle to thinned stands. Furthermore, this beetle is seldom found breeding in felled trees or in the larger portions of slash.

Although it has been known to breed in girdled trees during non-epidemic years, it is usually at such a low ebb at such times that it is not apt to constitute a menace to crop trees.

If a condition of drought prevails for a considerable period of time while a stand is being improved, such operation might result in attracting the beetle, although such is not always the case as is noted below. As a matter of caution, frequent inspections should be made, and if an attack is found, suspend cutting operations and proceed at once with control measures.

Broadly speaking, the pines of the Coastal Plain, in comparison with those of the Piedmont and mountainous regions, are unusually free from attacks of the southern pine beetle ~~beetles~~. Even the occurrence



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of drought does not necessarily signify that an infestation will occur in this area, as will be noted in reviewing the past history of beetle outbreaks discussed below. It is only occasionally when preceded by a combination of weakening influences, as mentioned above, that outbreaks occur.

#### The Ips Engraver Beetle

It is only by studying the history of outbreaks of Ips engraver beetles over a period of years in different sections of the country, and as influenced by various environmental factors, that one is able to comprehend the significance of attacks of this beetle in pine stands.

It has been demonstrated many times that the mere accumulation of slash over extensive areas, even when created during the summer months, does not necessarily in itself constitute a hazard to standing trees. It is mainly when the beetles have bred up in large numbers, either by the presence of slash, or by trees being weakened from the effects of storms, fire, drought, etc., and then the food supply becoming suddenly exhausted, that they become a menace to standing timber. Under such conditions sporadic outbreaks are liable to occur and then sometimes apparently healthy trees are infested and killed, although many of the attacks are unsuccessful.

In view of the above, the cutting of pine during the summer months is more likely to lessen than increase the dangers of insect attack. This view is taken because of the



fact that there is a large quantity of green material now on hand, resulting from the late fall and winter treatments, which will be infested as soon as the flight period begins, and if there is a cessation of cutting operations, the beetles, upon emerging from the slash, may infest standing trees.

In regions where the majority of the trees have been hackgirdled it is not anticipated that an attack will occur the season following treatment, since such trees usually die slowly.

Some attack during the first season may be expected in that portion of the stem of girdled trees below the point of ringing, because by treating in this manner the basal part soon becomes weakened through starvation. Turpentine beetles will undoubtedly be the first to attack under such conditions. Following this, some of the woodborers and Ips engraver beetles may infest the same part. The upper stem is not likely to be infested until the second or third season following treatment. Consequently girdled trees are not apt to constitute an insect menace, especially during years when conditions are favorable for tree growth.

#### History of Summer Cuttings Previous to 1913.

It is believed that a brief review of the history of some of the cases where summer cuttings have been made, will aid in clarifying the Bureau's stand in making recommendations which may seem somewhat contrary to general prevailing opinions.



It is believed that such opinions have been formulated largely as the result of impressions gained by woodsmen and others who have observed trees being attacked, and sometimes killed under circumstances where a combination of interrelated factors were involved, and where insects were not of primary importance.

Such conditions favoring insect attack usually prevail, as previously stated, during periods of drought or following the occurrence of fires, blowdowns, etc.; also where green logs and lumber are piled close to trees.

There may also be in the minds of those who are hesitant in extending operations into the active season the fact that there are occasional references in government publications to the effect that summer cuttings should be avoided. This may be explained by the fact that these recommendations were made years ago as a matter of precaution in the absence of sufficient data to formulate a definite policy at that time.

During recent years, as the result of numerous investigations by the personnel of this Division, there had been accumulated sufficient information on the habits of bark beetles, and the hazards involved as the result of summer cuttings, that it has made possible a revision of recommendations in this respect.

Herewith is presented the evidence on which the present recommendations are partially based.

#### Injury to Seed and to Tarpented Trees

During 1920 a large operator of pine in the South reported the dying of numbers of seed and of tarpented trees that were being



attacked by insects. An investigation of the situation revealed that the bark beetle Ips calligraphus Germ. was attacking only those trees located in cut-over land, adjacent to where cutting operations had ceased, that had been injured as the result of skidding operations, recent fires and destructive methods of turpentineing; and that the damage was rare where such operations were continuous throughout the year.

It may be concluded, therefore, that attraction was due principally to the weakened condition of the trees, rather than to extensive cutting operations and that insects were only of secondary importance.

#### Losses Primarily Due to Drought

During 1924 and continuing into 1925, some 100,000,000 bd. ft. of merchantable pine was estimated to have been killed, all of which was infested by Ips bark beetles. This timber was located in the general region comprising eastern Texas, Louisiana, southern Mississippi and western Alabama. The findings, as the result of an investigation, were to the effect that both round and turpentineed timber were being attacked and that the losses were as great in the areas away from logging operations as in and around them. A condition of drought was found to have prevailed over the entire affected area and ~~that~~ as the results of such weakening influences Ips were infesting the trees. No trees were reported as being infested outside of the drought area and as soon as the deficit in precipitation was made up within it, attacks ceased.



Again, in 1931, a somewhat similar outbreak occurred in sections of Georgia and Florida. In this case drought was again primarily responsible for the dying condition of pines over an extensive area. In addition to Ips, a few southern pine beetles were found. The latter were present in such small numbers, however, that they were of little importance.

#### Loss Primarily Due to Fire

During the period 1931 and 1932, extensive thinnings were made by the Forest Service on the Osceola Experimental Area. The trees were removed from the stand during the fall and winter months. After felling they were lopped, their branches scattered, and the poles left lying on the ground. During this period the weather was so mild that Ips engraver beetles were active and infested the slash. None of the standing trees were attacked until shortly after April 1932, at which time a severe fire swept the stand.

#### Hazards Due to Girdling

Inasmuch as girdling is a method used in cultural work to improve stands, and that heavy thinnings are being made in this manner in some localities, such as the Ozarks, it may be of interest to briefly present here the findings of a girdling experiment of three years duration that was conducted in the Pisgah National Forest near Asheville, N. C., during the period 1925-1928.

In this test young second growth shortleaf and pitch pines were used. Although they were girdled in different ways, only the hackgirdling method will be referred to here, since this is the one of most interest in the present instance.



These pines were treated monthly throughout the year by removing a chip of wood all around the tree. During the first year of the experiment a condition of drought prevailed. In spite of this it was found that the trees did not become sufficiently weakened to attract insects in that portion of the stem above the girdle and that none of the trees died during the twelve month period following treatment. The first attacks were those of the turpentine beetles which infested that portion below the girdle where growth had ceased. This part was also attractive to  Ips  barkbeetles and to woodborers at a later period. The portion of the stem above the girdle was not infested by  Ips  until the second season when some of the trees began to die. It required a period of three years before all of the trees were dead. Such death is attributed mainly to starvation rather than to beetle infestation.

Only a few trees were attacked by the southern pine beetle. This occurred during 1925. Most of the attack at this time was centered upon a group of pines that was located in a nearby bottomland which was experiencing a marked deficit in rainfall.

Thus it appears that under conditions similar to the above, trees treated culturally by girdling do not constitute much of an insect hazard to the stand even when the work is done throughout the year.



### Results of the 1933 Cuttings

During the period October 1, 1933, to March 15, 1934, B. J. Hickenpohler, under the direction of this Bureau, visited approximately 65 federal and state camps, scattered throughout the range of the southern pine beetle and Ips bark beetles, to determine the importance of these insects in relation to the cutting of pine in Emergency Conservation Work being done in the southeastern section of the country.

In this rather extensive survey, camps were usually chosen that had cut a sufficient amount of pine under conditions that were formerly thought to be optimum for the attraction of bark beetles to the surrounding stand.

During the course of this investigation it was found that, in general, very little pine was cut in timber stand improvement work that was done on the national forests during the summer and fall of 1933. That work was done in this respect was mainly confined to the Ozark, Ouachita, Ucker and the George Washington forests, where stands were largely thinned by girdling and to the Alabama, Osceola, Ucker and Cherokee forests where the thinnings consisted of cuttings.

Most of the pine that was cut in the state camps in the region comprising Virginia to Arkansas was done by CCC labor in the building of trails, roads, telephone lines and fire lanes. As the result of this work a variety of conditions as to species present, size of trees, density of the stand, the amount of cutting, disposal of brush and logs, past status of the bark beetles in the area, etc., were encountered and their effect noted.



In view of the above practices it is of interest to note what losses were experienced because of insect attack.

Results of the inspection of each camp are presented in tabular form in Tables I and II. The former relates to work done in state camps, the latter to that done in national forests.

From an examination of the tables it is apparent that no injury of any consequence has resulted from the summer cutting of pine. That attacks occurred in this respect were largely confined to a few isolated trees. This usually consisted of from one to ten small saplings (1"-3" D.B.H.). Occasionally a few larger trees were attacked. Such damage was usually confined to the camp site, scattered along the fire lanes, or along truck trails. These attacks never spread to other standing trees. In general there seemed to be no correlation between the attack and the amount of felled material left in the stand. However, where no material whatever was left, or the logs were peeled, no attack was noticed in the standing trees, while if the poles were left, a few trees were almost always unsuccessfully attacked by Ips calligraphus.

Of all the localities visited it will be noted that in only four instances were attacks of the southern pine beetle found and these were of little consequence. Thus, in three national forests a total of only 22 trees were attacked, and in one state camp a group of 25 trees were infested. These attacks were so small that the infestation did not spread to any of the surrounding trees.



This extensive survey seems to indicate that the danger of attracting bark beetles by cutting pines in midsummer is not so pronounced as heretofore generally believed. Because of this it is believed that in years of normal precipitation, pine can be cut or girdled without serious danger of causing an appreciable loss of trees in the surrounding stand.

#### Recommendations Concerning Future Work.

It is realized that unusual conditions are being created by this extensive and in some localities intensive cutting in pine stands. This factor in combination with the variable habits of the insects involved makes it difficult to predict the ultimate results of the work in relation to insect damage.

However, because of the extensive survey of the past season's work, together with the wide experience the Bureau of Entomology has gained through the study of these insects under varying conditions in different parts of the country, it makes it possible to advance the following generalizations and recommendations:

- (1) No apprehension need be felt in cutting a few pines in a yellow pine hardwood type such as is found on the higher mountain slopes in Tennessee, Georgia, South Carolina, North Carolina and in Virginia.
- (2) Insect damage to pure pine stands is not as likely to occur on Coastal Plain and lower Piedmont Plateau as to the Upper Piedmont Plateau and mountainous regions.



- (3) Unless drought conditions prevail, or the trees in the area have recently been injured by fire, cutting in pine stands can be continued throughout the summer.
- (4) The slash resulting from cuttings should be handled according to methods recommended by the Forest Service in each region.
- (5) Provide for a periodic inspection of stands in which considerable pine has been cut in order to detect any incipient infestations. This is especially important during or following very dry weather.
- (6) If an infestation of the southern pine beetle is found, the trees should be removed and the bark destroyed while the brood is still in the bark. This will be within 40 days after attack and before the needles have turned entirely reddish brown. Treatment of these trees after this time is useless as the injurious insect brood has emerged. Surrounding green trees should be examined for attack and treated if necessary.
- (7) Provide for adequate fire protection and do not injure any trees while burning the slash, as these trees are subject to insect attack.
- (8) Any serious outbreaks should be reported as soon as possible and such information should be supported preferably by submitting a section of the bark, or some of the beetles which have been removed from the midstem of infested trees.



Communicate either with the Forest Insect Division of the  
Bureau of Entomology, Washington, D. C., or the Entomological  
Laboratory at the Appalachian Forest Experiment Station,  
223 Federal Building, Asheville, N. C.

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# RESULTS OF CUTTING PINE AT STATE CAMPS

State and Camp: Number	Type of Work	Character : Of Stand	Amount of Pine : Cut Degree	Disposal: : Injury	D. f. : Injury	Injury	Possibility of Future : Infestations
Ark. P-52	Road	Mixed	Light to Medium	Mostly Removed	None	1 Tree Unsuccess. Attacked	No danger of Inducing An Attack
Ark. P-51	"	Pure Stands of Pine	"	"	"	Few un- successful Attacks	"
Ark. P-56	"	"	Light	"	"	3 Small Trees Killed	"
Ark. P-57	"	"	Medium to Heavy	Much Left	"	11 Trees Killed	"
Ga. P-72	Fire Lanes	"	"	Mostly Removed	"	None	"
Ga. P-64	"	"	"	"	"	2 Small Trees Killed	"
Ga. P-63	"	"	"	"	"	20 Small Trees Killed	"
Ga. P-78	"	Mixed & Pure	Light to Medium	"	"	None	"
Ga. S. P. 1.	Park Improv.	Mixed	None	---	"	"	"
Ga. P-69	Road	Mixed & Pure	Light to Medium	Complete	"	"	"



State and Camp: Number	Type of Work	Character: of Stand	Amount of Cut	Pine Disposal:	D. f. Injury	Ins Jury	Possibility of Future Infestations	
Ga. P-79	Road	Mixed and Pure	Light to Medium	Mostly Removed	None	None	No danger of Inducing An Attack	
Ga. P-74	"	"	"	"	"	"	"	
Va. P-71	Fire Lanes (Oct.)	"	"	Left	"	"	"	
Va. S-68	Clean Up Roads	Mixed	Very Light	Removed	"	"	"	
Va. P-70	Roads (Oct.)	"	"	Mostly Removed	"	"	"	
Va. P-56	"	"	"	"	"	"	"	
Va. S-62	Roads & Cleanings	Mixed and Pure	Light To Heavy	All Re- moved	25 Trees Killed 2 Spots	3 Small Trees Killed	Not certain whether the D.f. attacks were induced by cutting	Close inspec- tion to detect future out- breaks
Va. S-52	Roads & Firelanes	Mixed	Light	Mostly removed	None	None	No hazard created	
N. C. P-56	"	Pure & Mixed	Light to Heavy	Complete	None	Few trees killed	"	
N. C. P-59	"	Pure	Heavy	Mostly Removed	"	1 Tree Unsuc. Attacked	"	
N. C. P-58	"	"	Medium	"	"	Few trees Unsuc. attacked.	"	
N. C. P-53	"	Pure	Light to Medium	"	"	2 Trees Killed	"	



State and Camp: Number	Type of Work	Character: of Stand	Amount of Cut	Pine Disposal: Tree	D. f. Injury	Log Injury	Possibility of Future Infestation
S. C. P-53	Firelanes Tower Sites	Pure and Mixed	Light to Medium	Mostly Re- moved	None	None	No hazard created
S. C. P-62	Firelanes Roads	Pure	Heavy	Much Left	"	"	"
S. C. P-51	Roads	Mixed and Pure	Light to Medium	Mostly Re- moved	"	"	"
S. C. P-55	Firelanes & Roads	"	"	Much Left	"	5 small Trees killed	"
S. C. P-52	"	"	"	"	"	None	"
S. C. P-66	Roads and Erosion Dams (thinnings)	"	"	Mostly Re- moved	"	"	"
Fla. P-57	Firelanes & Roads	Pure	Medium to Heavy	Much left	"	1 unsuc. attack	"
Fla. P-53	"	"	Medium	"	"	None	"
Fla. P-54	"	"	Medium to Heavy	"	"	"	"
Ala. P-62	"	Pure & Mixed	Light to Medium	Mostly Re- moved	"	"	"
Ala. P-59	"	Pure	Medium	"	"	"	"
Ala. S-56	Firelanes Thinnings	Pure & Mixed	"	"	"	"	"

\* Refers to poles and logs  
tops and branches burned  
unless otherwise stated.



## II. RESULTS OF CUTTING PINE ON NATIONAL FORESTS.

National Forest:		Pine Cutting		Pine Cutting		Treatment:		D. f.	Ips	Danger of:		Remarks
and Camp No.		:During Summer		:During Winter		: In		Injury	Injury	Inducing		
		:Object:	Ant.	:Stand:	Object:	Trees	:Stand:	Cultural	:	:Attack	:	
		:	cut	:	:	per	:	Work	:	:	:	
Geo. Wash. F-2	Roads	Very Light		Mixed Cultural	2-3	Mixed	Felled	None	None	None		
Geo. Wash. F-3	"	"	"	"	2-3	"	Felled or girdled	"	"	"		12 Trees Girdled Per Acre on 60 acres.
Geo. Wash. F-11	"	"	"	"	"	"	"	"	"	"		No pure stands.
Geo. Wash. F-10	Cultural	Light	Pure	"	"	"	Girdled	"	"	"		Only 25 acres of pure pine treated.
Geo. Wash. F-13	Roads	Very light	Mixed	"	"	"	Felled or Girdled	"	"	"		Very little yellow pine
Nantahala, F-9	"	"	"	"	50	Pure	"	"	"	"		Only 75 acres of Pure Pine treated
Nantahala, F-9 (Georgia)	"	"	"	"	2-3	Mixed	"	"	2 trees killed in camp	Very little		D.f. has been active in the area
Nantahala, F-1	"	Medium	Mixed & Pure	"	"	"	"	8 trees killed	None	"		Large tree felled in June induced D.f. attack
Nantahala, F-2	"	"	"	"	"	"	"	None	8 trees killed	"		D.f. active in 1933
Nantahala, F-6	"	Light	"	"	15	"	"	12 trees killed in camp	None	"		250 acres pure pine treated; D.f. active in 1933.







National Forest:		Pine Cutting	Pine Cutting	Treatment:	D. f.	Ips	Danger of			
and Camp No.	:	During Summer	During Winter	:	in	Injury	Injury	Inducing	:	Remarks
:	:	Object:	Amt. :	Stand:	Object:	Trees :	Stand:	Cultural :	:	:
:	:	:	:	:	per :	:	Work :	:	:	:
:	:	:	:	:	acre :	:	:	:	:	:
Quachita, F-13	Roads	Very Pure light	Cultu- ral	Occa- sional	Mixed	Felled	None	4 trees killed	None	D.f.active in 1931
Unaka National Forest	"	"	Mixed	"	"	Felled or Girdled	"	None	"	D.f.killed 12 trees on ridge in 1933.
Osceola Nation- al Forest	---	---	---	"	100- 300	"	Felled	"	"	Ips may kill few trees in 1934

\* Polas left in the stand  
unless otherwise stated.